Although it grows abundantly in the aqueous solution employed, it exerts no reducing action on the nitric acid.

Bacillus scissus.—In form this organism much resembles *Bacillus prodigiosus.* In no case were spores observed. In drop cultivations it is seen to be very motile.

It produces pale light green surface expansions on gelatine plates which, under a low power (× 100 diameters), are seen to be of fine granular texture, the edge being much frayed out.

In tubes the gelatine and agar-agar become tinted green.

It powerfully reduces nitrates to nitrites in the solution employed.

Of the above, the first nine were derived from water, whilst the remaining three were obtained from garden soil.

The original descriptions are illustrated by drawings of the various micro-organisms as seen in microscopic preparations, and of the appearances to which they give rise in gelatine-plate and other cultivations.

II. "Further Observations on the Electromotive Properties of the Electrical Organ of *Torpedo marmorata*." By Francis Gotch, M.A. Oxon., B.A., B.Sc. London. Communicated by Prof. J. Burdon Sanderson, F.R.S. Received February 23, 1888.

(Abstract.)

In the present memoir the author details the results of further observations as to the electromotive properties of the electrical organ of Torpedo, the experiments being carried out in October, 1887, at the laboratory of the Société Scientifique d'Arcachon.

I. The first part of the work deals entirely with the phenomena of "irreciprocal conduction" in the organ of Torpedo, as described by du Bois-Reymond.

From du Bois-Reymond's experiments it would appear that the organ possesses the remarkable property of conducting an intense current of short duration, led lengthwise through its columns, better when the current is directed from its ventral to its dorsal surface than when directed the reverse way. The former direction coincides with that of the current of the shock of the organ, and is therefore termed by him "homodromous," the latter being opposite in direction, is termed "heterodromous." The evidence rests upon the value of the galvanometric deflections obtained when both currents are allowed to traverse a strip of organ and a galvanometric circuit. The deflections are markedly unequal, particularly when induced currents are used, the homodromous effect being always much greater than the

heterodromous. The homodromous current must therefore either encounter less resistance than the heterodromous, or its electromotive force must be suddenly strengthened, and that of the heterodromous current weakened, by the sudden establishment in the tissue of a new source of electromotive energy. The first is the view taken by Professor du Bois-Reymond.

(1.) The present rheotome experiments reveal (*a*) the new fact that the passage of such intense currents of short duration is always followed by an excitatory response (shock) in the tissue; (*b*) that if the intense current due to this response is allowed to affect the galvanometer as well as the induced or other exciting current, then by obvious algebraic summation the homodromous deflection must be much larger than the heterodromous; (*c*) and that when by means of a fast-moving rheotome the induction shock only is allowed to affect the instrument, no irreciprocity is found.

The author therefore assumes that the phenomena of irreciprocal conduction are in reality excitatory phenomena, the nature of which, from the methods of investigation used, have not been recognised.

(2.) The time relations of this response of the isolated strip of the organ to the direct stimulation by the traversing induction shock are now for the first time investigated, by means of the rheotome, and the influence of temperature and other conditions upon these is shown by experimental evidence.

II. The second part deals with entirely novel phenomena, namely, the excitation of the organ by the current of its own excitatory state. It is shown that in vigorous summer fish every response of the whole or part of the organ to a single excitation of its nerves is followed by a second response, due to the passage through its own substance of the intense current of the first response. In other words the shock of the organ excites its own nerve fibres and nerve endings, producing a feebler second shock, which in a similar manner evolves a feebler third shock; this a fourth, and so on.

The response of the isolated organ to nerve excitation is thus multiple; a primary, secondary, tertiary response following the application to the nerve of a single stimulus. Since all these responses produce currents similarly directed through the columns of the organ, each column during its activity must reinforce by its echoes the force of the primary explosion, both in its own substance and also in that of its neighbours.